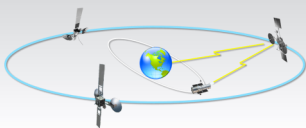




# Space Network Ground Segment Sustainment (SGSS) Newsletter

## SGSS Goals and Objectives

- Provide a ground system that will allow the Space Network to provide reliable service for the years to come
- Allow a reduction in the cost of operating and maintaining the Space Network
- Reduce communication costs for our customers
- Implement and extensible, flexible, and scalable ground terminal architecture
- Continue to provide existing Space Network functionality
- Enhance the continuity of operations posture of the Space Network
- Transition from the legacy system to the new SGSS system in a low risk environment
- Meet or exceed the legacy proficiency, performance, and availability requirements



**GENERAL DYNAMICS**  
C4 Systems

**HARRIS**



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## SGSS Status Update

Incremental development, integration and testing of the SGSS system is proceeding at General Dynamics' (GD) facility in Scottsdale, AZ, and at key subcontractor locations in Florida, Colorado and Maryland. Increment A2: Foundation is complete through system integration; A2 built on the prototype infrastructure integrating core functionality that included limited Ground Segment control plane messaging and TDRS 1st Generation spacecraft telemetry and control capabilities. Increment A3: Bearer Network and Basic Ground Terminal (GT) has completed development and integration of basic TT&C for all three TDRS Generations, and selected bearer plane (i.e., user services) bi-directional functionality from RF through digital signal processing at an isolated GT. A3 functionality has been handed over from the Development Team to the System I&T Team to continue functional testing. The System I&T Team successfully demonstrated basic TT&C, initial end-user services along the bearer path, and manual schedule execution of a single user service in December 2014. Increment A4: Functional GT and Basic SN Operations Center is mid-way through its development phase. Increments A5 and A6 will complete development / I&T of SN Operations Center and User Services functionality, Life Cycle Features, and all external interfaces.

## SGSS Customer Technical Interchange Meeting (TIM)

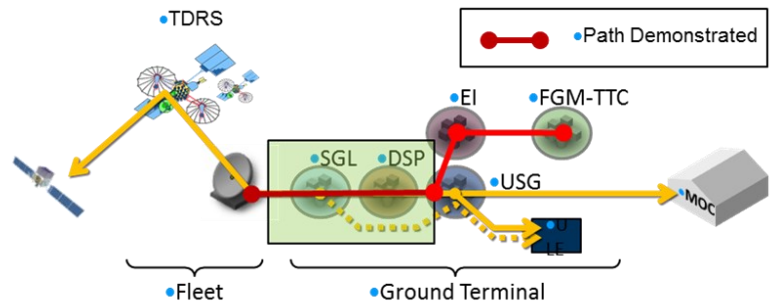
SGSS is planning a Customer TIM in March 2015, hosted by NIMO. A number of interface topics will be covered including: customer interfaces, scheduling, data transport, tracking and early testing. For additional information or to suggest additional topics, please contact Vir Thanvi (vir.thanvi@nasa.gov). The SGSS Customer TIM presentations are available at <http://esc.gsfc.nasa.gov/space-communications/sgss/349.html>

# SGSS Demonstrations

SGSS has successfully conducted several demonstrations of SGSS functionality the system has progressed through development and integration. The demonstrations were executed in the GD lab on actual system hardware in an environment representative of the field deployment.

## S-band TT&C Demo

This demonstration showcased the Telemetry, Tracking, and Command (TT&C) bearer-Like path. The purpose of this demo was to show the initial integration of the Space Ground Link (SGL), Digital Signal Processing (DSP) using production hardware, Fleet & Ground Management (FGM-TTC) and Enterprise Infrastructure (EI) environments. In the diagram on the right, SGL forms the link between the antenna and the DSP equipment. The DSP then converts the down link telemetry data from the antenna to a digital signal for the use of the end user.



## A3 DSP Demo



SGL Equipment

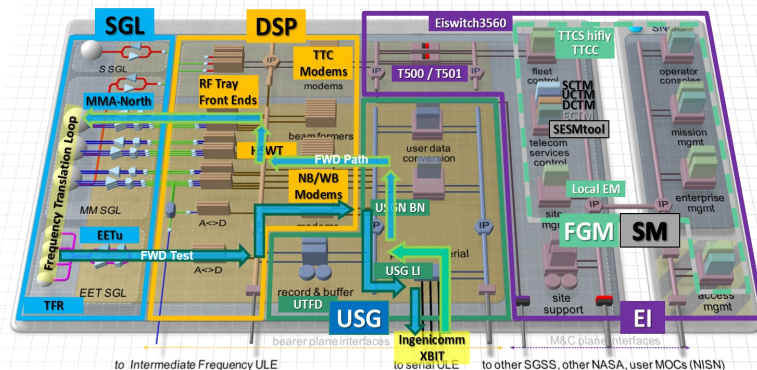
This demonstration successfully showcased the DSP Element-level functionality which has been integrated. The capabilities demonstrated were the core Increment A3 DSP functions including: Bearer-plane, Management & Control (M&C) plane, TT&C, and Fault Management. Functional Analog IF loopback and Simultaneous receive processing.



DSP Equipment

## A3 Baseline Demo

This demo showcased A3 developed system functions & capabilities. It highlighted the operation and interaction of multiple elements and the execution of end-to-end scenarios and capabilities. The demonstration included K-band telemetry and command service setup and activation through operator Human-Machine Interfaces (HMIs), setup, configuration, and utilization of KuSAF user service, and failover/fault recovery of KSAF low rate bit stream Local Interface service.



## SN-SGSS Coordination

The Space Network (SN) and SGSS Project engage in frequent working level and management coordination meetings. These include a weekly technical working session, monthly management tag-up meetings, and semi-annual Management Interchange Meetings that include NASA GSFC and White Sands Complex Site managers, as well as corporate / program managers of the SGSS Implementation Contractor and the SN's Maintenance and Operations Contractor. These technical and management coordination meetings complement the day-to-day engagement of the SGSS Project Office team and SN subject matter experts reviewing implementation details, supporting resolution of technical questions, and reviewing test plans / procedures and witnessing tests.

### SGSS Comings / Goings

We would like to recognize the hard work and effort of our team members who have left the project and also extend a warm welcome to all the newest members of the SGSS team.

#### Comings

Edwin Griego  
Tynika (Nikki) Rawlings

#### Goings

Kevin McCarthy  
Mozetta Edwards

### Early Testing Opportunities

SGSS is on target to begin early testing with external interfaces in October 2015. The early testing activities are designed to facilitate early identification of issues and minimize the impact of migrating from current SNGS to SGSS interfaces. The GD lab will be implementing the actual environment that will be used at the White Sands Complex (WSC) and is expected to support the majority of external data flows.

### ICD Progress

The SGSS Project continues to work with individual SN current and planned customer missions to document the SN to Mission interface from both legacy SN and SGSS-specific perspectives. The mission-specific interface definitions will supplement the more generic customer interface control documents (SGSS to User MOC / SGSS to User Platform / SGSS to User Local Equipment ICDs). An initial exercise focused primarily on the bearer plane data processing and transport interface definitions and resulted in GD's development of Mission-Specific Addenda. Addenda for the additional defined SN customer missions in the SGSS era will be developed over the next year. Additionally, the SN and SGSS Project Teams, assisted by NIMO, are working closely with GD to evolve the addenda into more user-friendly SN-to-Mission ICDs for review with, and eventual signature by, each customer mission.

### SGSS Q&A

**Q: How were the missions on the SGSS mission list maintained?**



A: Originally, a list was created primarily using data gathered from the Networks Integration Management Office (NIMO) and through the Customer TIM process. SGSS periodically reviews the mission list with the SN and NIMO to maintain an updated list based on the status and timeline of the mission in conjunction with the timeline for the SGSS transition and deployment schedule. The SGSS Project maintains this information and tracks the status of potential missions in the SGSS era.



## Q & A

**Get to know...**



**Carrie White**  
**Deputy Project Manager**

### **What do you like the best so far about working on SGSS?**

I like development projects in general so that aspect of working on SGSS appeals to me. Having worked in the SN and for the TDRS Project previously, I've had the pleasure of working with a number of the SGSS personnel before and I'm looking forward to working with them again.

### **What do you expect to be the biggest change and/or adjustment on SGSS?**

The pace of development projects ebbs and flows but is typically fairly aggressive. While I'm on the learning curve, project activities and needs are also progressing so adjusting to the rhythm of the project, and getting up to speed.

### **What do you look forward with this new project and position?**

In the short term, completing increment A3 Level 4 I&T and increment A4 Level 4 I&T. Down the road I look forward to the first ORR as it's good to keep an end goal in mind. We will be providing a generational upgrade to the Space Network and will face a number of issues in multiple domains as we move forward but that's part of the excitement of working on a large-scale development project. I look forward to the first ORR envisioning the satisfaction we will encounter from having done our best over the next several years.

## **SpaceOps 2014**

The SGSS Project is proud to announce that several of our team members presented at the 13th International Conference on Space Operations on May 5-9, 2014. Bruce Schupler (NASA/HTSI) and Jacob Spencer (GSC4S) presented their paper on *Digital Signal Distribution and Processing in the NASA Space Network Ground Segment Sustainment Project*. Nicole Loomis (NASA/BAH) presented her paper on *Modernizing the NASA Space Network Ground Systems for Centralized Management and Control of Distributed Shared Resources*. Roy Vaninetti (Harris) and Kevin Merchant (GD) presented their paper on *Radially Combined Solid State High Power Amplifier for Space Communications*.

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